Paper No. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ANANDA HOSAKERE KUMAR, BARRY JAY THALER
and ASHOK NARAYAN PRABHU

Appeal No. 2001-1660
Application No. 09/146,478

BRIEF

Before GARRIS, PAK, and POTEATE, Administrative Patent Judges.

PAK, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 through 12, 16 through 23 and 29 through 33. Claims 27 and 28, the remaining claims in the above-identified application, have been indicated to be allowable. See the Advisory Action dated July 12, 2000, Paper No. 9.

APPEALED SUBJECT MATTER

Claims 1, 16 and 29 are representative of the subject matter on appeal and read as follows:

1. An article comprising a plurality of green tape layers aligned with a support substrate having a bonding glass layer thereon, the article having a single topmost layer over the green tape layers, the topmost layer comprising a ceramic having a sintering temperature higher than the ceramic of the green tape layers admixed with about 40 percent by weight of a resin binder.

16. A method of providing a green tape stack having improved dimensional control comprising

a) aligning a plurality of green tapes on a metal support substrate having a bonding glass layer thereon,

b) providing a single topmost layer over said aligned green tapes of an inert ceramic having a sintering temperature higher than the sinterimg [sic.sintering] temperature of the green tape ceramic admixed with about 40 percent by weight of a resin binder to form an inert ceramic tape.

29. An article comprising a plurality of green tape layers aligned with a metal support substrate having a bonding glass layer thereon, the green tape layers having one or more punched cavities therein, the article having a single topmost layer over the green tape layers, said topmost layer comprising a ceramic having a sintering temperature higher than the ceramic of the green tape layers admixed with a resin binder.

PRIOR ART

The examiner relies on the following prior art references:

Enloe et al. (Enloe)	4,920,640	May 1, 1990
Mikeska et al. (Mikeska)	5,254,191	Oct. 19, 1993
Prabhu	5,277,724	Jan. 11, 1994
Fukuta et al. (Fukuta)	5,456,778	Oct. 10, 1995 (Filed Aug. 17, 1993)

REJECTION

The appealed claims stand rejected as follows[1]:

1) Claims 1 through 6, 11, 12, 16 through 19, 22, 23 and 29 through 33 under 35 U.S.C. § 103, as unpatentable over Mikeska in view of Prabhu or in view of Fukuta and Prabhu; and

2) Claims 7 through 12, 19 through 23 and 29 through 33 under 35 U.S.C. § 103 as "unpatentable over the references as applied above, and further in view of Enloe..."

OPINION

We have carefully reviewed the claims, specification and prior art, including all of the evidence and arguments advanced by both the examiner and the appellants in support of their respective positions. This review has led us to conclude that the examiner's Section 103 rejections are well founded. Accordingly, we will sustain the examiner's Section 103 rejections for substantially the reasons set forth in the Answer. We add the following primarily for emphasis and completeness.

We turn first to the examiner's rejection of claims 1 through 6, 11, 12, 16 through 19, 22, 23 and 29 through 33 under 35 U.S.C. § 103, as unpatentable over Mikeska in view of Prabhu or in

[1] In the event of further prosecution, the examiner is advised to determine whether claims 1 through 6 of U.S. Patent 5,876,536 issued to Kumar et al. on March 2, 1999, affect the patentability of the claimed subject matter under the judicially created doctrine of obviousness-type double patenting.

view of Fukuta and Prabhu.[2] Mikeska, like the claimed subject matter, relates to a method for "reducing X-Y shrinkage during the firing of ceramic bodies" and the articles resulting therefrom. See, e.g., column 4, lines 14-16 and 28-38. Mikeska states that (column 4, lines 39-46):

> Central to the invention is the use of a flexible ceramic constraining layer which is applied to the surface(s) of the ceramic circuit layers. The constraining layer serves several functions: (1) it provides a uniform high friction contact layer which substantially reduces shrinkage in the plane of the sintering part; and (2) it provides an escape pathway for the volatile components of the ceramic tape prior to sintering.

The constraining layer of Mikeska comprises non-metallic (ceramic) particles, such as alumina, magnesium, quartz and boron nitride, dispersed in a solid organic polymer binder. Compare column 11, lines 2-5 and 24-28 with the appellants' claim 2. The non-metallic (ceramic) particles in the constraining layer do not undergo sintering during the sintering of the ceramic bodies. See, e.g., column 11, lines 2-5 and 24-28. The constraining layer containing non-metallic (ceramic) particles is said to have a higher sintering temperature than the ceramic bodies, thus indicating the non-metallic (ceramic) particles as having a higher sintering temperature than that of the ceramic bodies

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[2] The appellants do not state that the claims on appeal do not stand or fall together. See the Brief, page 4. Rather, the appellants state (*Id.*) that:

> Claims 1-12 and 29 are article claims.
> Claims 16-23 and 30-33 are directed to method. The article and method claims will be separately discussed and should be separately considered in this appeal.

Therefore, for purposes of this appeal, we select claims 1 and 16 and determine the propriety of this rejection based on these claims alone consistent with 37 CFR § 1.192(c)(7)(2000). *See also In re McDaniel*, 293 F.3d 1379, 1383, 63 USPQ2d 1462, 1465 (Fed. Cir. 2002). To the extent that we need to address the other rejected claims, we direct attention to the examiner's findings and conclusions set forth in the Answer.

(ceramic particles of green tape layers). See column 5, line 65 to column 6, line 15 and column 7, lines 57-66, together with the appellants' admission at page 6 of the Brief. This constraining layer is placed on the top surface of the ceramic parts, such as a plurality of green tape (dielectric) layers, aligned with a support substrate. See column 12, line 59 to column 13, line 32. The ability to cofire the green tape layers on a rigid substrate made of a high strength material (metal) provides various advantages. See column 13, lines 22-32.

The examiner recognizes that Mikeska does not mention that this rigid substrate has a bonding glass layer. See the Answer, page 6. However, the examiner has correctly found that Prabhu teaches cofiring a multi-layered green tape bonded on a metal substrate via an appropriate glass bonding layer. See the Answer, page 6, together with Prabhu, column 1, lines 58-67 and column 4, lines 13-19. The examiner has also found (Answer, page 6), and we agree, that Prabhu states (column 4, lines 7-12):

> The adhesion of the ceramic layer 20 [green tape layer] to the base 12 [metal substrate], resulting from the utilization of the glass bonding layer 18, significantly minimizes the x-y shrinkage of the ceramic layer during co-firing, and the shrinkage in volume of the ceramic is mostly confined to the z thickness dimension.

Given the above teachings, we concur with the examiner that one of ordinary skill in the art would have been led to bond the constraining layer containing multi-layered green tape taught by Mikeska on a rigid metal substrate via an appropriate glass bonding layer, motivated by a reasonable expectation of further minimizing the x-y shrinkage of the resulting multi-layered green tape.

The appellants argue that Mikeska does not teach or suggest using the claimed amount of a resin binder in its constraining layer. See, e.g., the Brief, page 8. We disagree.

As found by the examiner (Answer, pages 7-8), it can be inferred from the amount of the non-metallic (ceramic) particles employed in Mikeska's constraining layer that the amount of the solid organic polymer (resin) binder employed therein, which constitutes the remaining component of the constraining layer, includes the amount of the resin binder recited in claims 1 and 16.[3] *See In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974) (the claimed invention is rendered prima facie obvious by the teachings of a prior art reference that discloses a range that touches the range recited in a claim). Moreover, we determine that Mikeska indicates that the amount of the solid organic polymer (resin) binder employed is no more than a result effective variable. *See In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990)(when "the difference between the claimed invention and the prior art is some range or other variable within the claim," the claimed invention is not deemed patentable unless the appellants show "that the claimed range achieves unexpected results relative to the prior art range"); *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) (it would be well within the knowledge of a skilled artisan to determine optimum or workable result effective variables). As is apparent from column 1, lines 39-65 and column 11, lines 16-23, of Mikeska, the amount of the solid organic

[3] See also Mikeska, column 11, line 63 to column 12, line 23.

polymer binder used in the constraining layer is optimized to form a constraining layer having desired flexibilities and desired volatile escape channels (voids).

The appellants argue that the green tapes of Mikeska are different from those of appellants in that they include only a small amount of polymeric binder together with high sintering temperature green tape materials." See, e.g., the Brief, pages 5-6. This argument fails from the outset because it is not based on limitations appearing in claims 1 and 16. *See In re Self*, 671 F.2d 1344, 1348, 213 USPQ 1, 5 (CCPA 1982).

To the extent that the claimed green tape material is interpreted to exclude green tape layers made of high sintering temperature materials and a low amount of a resin binder as suggested by the appellants, our conclusion would not be altered. As indicated *supra*, Mikeska's invention lies in using a flexible constraining layer. Although Mikeska exemplifies particular green tape layers made of high sintering temperature materials, it does not foreclose one of ordinary skill in the art from using the flexible constraining layer of Mikeska on conventional green tape layers made of low sintering temperature materials to minimize shrinkage problems. See column 4, lines 14-48 and column 8, lines 25-33. Also, Mikeska teaches that the green tape layers may contain a resin binder in an amount greater than 5%, e.g., 20%. See column 9, lines 54-57. Moreover, as found by the examiner (Answer, page 5), Fukuta teaches that ceramic green sheets made of low sintering temperature materials suffer from the shrinkage problems mentioned above. See column 5, lines

1-10, together with column 1, lines 13-22. Thus, we concur with the examiner that it would have been obvious to employ the constraining layer and rigid substrate of the type described in Mikeska to minimize shrinkage of conventional green tapes, such as those mentioned in Fukuta.

In view of the foregoing, we affirm the examiner's decision rejecting claims 1 through 6, 11, 12, 16 through 19, 22, 23 and 29 through 33 under 35 U.S.C. § 103.

We turn next to the examiner's rejection of claims 7 through 12, 19 through 23 and 29 through 33 under 35 U.S.C. § 103 as "unpatentable over the references as applied above, and further in view of Enloe."[4] Much of the relevant disclosures of Mikeska, Prabhu and Fukuta are discussed above. Moreover, as found by the examiner (Answer, page 8-9), Mikeska further discloses putting one or more cavities in its green tapes as required by claim 29. See also column 14, lines 7-20. Thus, we affirm this rejection as well.

CONCLUSION

[4] The appellants state (Brief, page 4) that:

> Claims 1-12 and 29 are article claims.
> Claims 16-23 and 30-33 are directed to method. The article and method claims will be separately discussed and should be separately considered in this appeal.

In the context of this rejection, however, the appellants do not separately argue any specific limitations recited in the rejected claims. See the Brief, pages 12-13. Therefore, for purposes of this appeal, we determine the propriety of this rejection based on claim 29 alone consistent with 37 CFR § 1.192(c)(7)(2000). *See also In re McDaniel*, 293 F.3d 1379, 1383, 63 USPQ2d 1462, 1465 (Fed. Cir. 2002). To the extent that we need to consider claims 8, 9 and 10 separately, we direct attention to the examiner's findings and conclusion set forth at page 9 of the Answer.

In summary, we affirm the examiner's decision rejecting all of the appealed claims under 35 U.S.C. § 103.

TIME PERIOD

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

BRADLEY R. GARRIS Administrative Patent Judge	)
CHUNG K. PAK Administrative Patent Judge	) BOARD OF PATENT) APPEALS) AND) INTERFERENCES
LINDA R. POTEATE Administrative Patent Judge	)

CKP/lp

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